

REMARKS

In the Office Action mailed March 3, 2003:

Claims 6-11 are allowed.

Claims 12-22 were withdrawn.

Claim 1 was rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. (U.S. Patent No. 5,977,626).

Reconsideration of this rejection is respectfully requested.

Claim 1 of Applicants' invention recites a ball-grid array package comprising a substrate, an integrated circuit device, a metal cap having a side wall portion and a top portion forming an internal cavity, and an epoxy encapsulant material filling a substantial portion of the internal cavity. The substrate has first and second sides. The integrated circuit device is attached to the first side of the substrate. The side wall portion of the metal cap is also attached to the first side of the substrate along a peripheral portion of the first side to form the internal cavity hosting the integrated circuit device therein. The epoxy encapsulant material is in contact with both the integrated circuit device and the top portion of the metal cap. The metal cap is constructed from a material selected from one of copper, aluminum, or alloys thereof.

In contrast to Applicants' invention, Wang et al. only teach a heat spreader 32 including a plane 32a having four pillar-like supporting members 32d at its four corners that protrude from the plane 32a. Wang et al. do not teach that the heat spreader 32 has a side wall portion attached to the top surface of substrate 20 along a peripheral portion of the top surface.

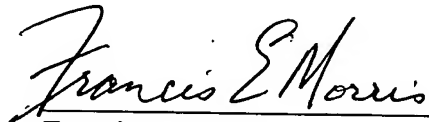
The shape of the side wall portion of the metal cap according to Applicants' invention is significantly different from that of the four pillar-like supporting members 32d of heat spreader 32 disclosed in Wang et al. Furthermore, the contact between the side wall portion of the metal cap and the substrate according to Applicants' invention is not restricted to the four corners of the top surface of substrate 20 disclosed in Wang et al, but rather extends along a peripheral portion of the substrate. This arrangement provides extended mechanical and thermal contact between the metal cap and the substrate, resulting in improved cooling of the IC device and less likelihood of warpage in the substrate. Because Wang et al. do not suggest Applicant's claimed structure, claim 1 is patentable over Wang et al.

In view of the foregoing, applicants believe that all of the claims are now in condition for allowance and respectfully requests the Examiner to pass the subject application to issue. If for any reason the Examiner believes any of the claims are not in condition for allowance, he is encouraged to phone the undersigned at (650) 849-7777 so that any remaining issues may be resolved.

Aside from the fee for the Petition for Extension of Time, no additional fee is believed due for filing this response. However, if a fee is due, please charge such fee to Pennie & Edmonds LLP's Deposit Account No. 16-1150.

Respectfully submitted,

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